A.D. 1854 . . . . N° 2547.

Electric Telegraphs.

(*This Invention did not proceed to the Great Seal.*)

PROVISIONAL SPECIFICATION left by William Thomson, William John Macquorn Rankine, and John Thomson at the Office of the Commissioners of Patents, with their Petition, on the 4th December 1854.

We, William Thomson, Professor of Natural Philosophy in the University and College of Glasgow, William John Macquorn Rankine, of Fifty-nine, Saint Vincent Street, Glasgow, Civil Engineer, and John Thomson, of Fifty-nine, Saint Vincent Street, Glasgow, Civil Engineer, do hereby declare the nature of our said Invention for "IMPROVEMENTS IN ELECTRICAL CONDUCTORS FOR TELEGRAPHIC COMMUNICATION" to be as follows:—

According to the usual construction of electrical conductors for telegraphic communication which are intended to be laid under ground or under water, one conducting wire of copper (or other metal possessing a good conducting power for electricity) is provided for the transmission of each independent electric current. Each such conducting wire is insulated by being coated with gutta percha in the following manner:—Gutta percha, being purified and maintained in a soft state in the usual manner, is contained in a strong metal box or receiver, provided with a piston; each wire to be coated passes into such box through a hole just large enough to let the wire pass easily, and issues from the box through the centre of a hole of the diameter of the gutta percha coating; the soft gutta percha being compressed by the piston, issues from the second hole in the form of a cylindrical cord, containing and carrying along with it the conducting wire, which thus issues from the box coated with gutta percha. By treating the cylindrical cord thus formed in the same manner in which the original wire was treated, it may, if required, be provided with a second coating of gutta percha external to the first. Conducting wires thus prepared are employed either singly or twisted into compound cords, one coated conducting wire for each independent current, and are protected in various ways; the way best suited for submarine purposes being to surround them first with a covering of hemp, and, secondly, with a casing of spirally-wound strong iron wires, so as to form an iron wire cable, containing in its interior the coated conducting wire or wires. Such is the ordinary construction of electrical conductors for telegraphic communication which are laid under ground or under water, which construction is extensively known and practised.

When a conducting wire of a given sectional area, coated and laid as above stated, is employed to produce signals at a given distance, the time required for the production of each signal includes the time lost in producing a statical electric charge of a certain intensity at the outer and inner surfaces of the coating, whereby the conducting wire is insulated; for until such statical electric charge is produced, the electric current in the wire cannot produce its full effect in acting on the apparatus whereby signals are made. The time lost from this cause is the greater, the smaller the wire and the thinner its insulating coating; and the less, the larger the wire and the thicker its insulating coating. Such loss of time also increases very rapidly with increased length of the conducting wire, and for lines of telegraphic communication extending to very long distances may be so great as seriously to impair the efficiency of the telegraph unless counteracted. Now, one of the means of counteracting the effect of great length of conductor in causing such loss of time is to increase greatly the sectional area of the conducting wire; but by such increase of sectional area the stiffness of the conducting wire would be increased at the same time, so as to increase the risk of its being damaged or broken by being bent, wound, coiled, or twisted. By employing, however, a strand, cord, or rope, consisting of several smaller wires in contact with each other, and with or without hempen or other cores, a sectional area equal to that of a larger wire may be obtained, combined with sufficient flexibility to prevent danger of breaking, or damage of the conducting wires by their being bent, wound, coiled, or twisted; and even supposing a partial breakage to occur, such a strand, cord, or rope also affords security against the evil effects of such breakage, for so long as the whole of the wires of which it is composed are not broken across at one spot, the communication will continue to be efficient.

The nature of our Invention consists in providing for each independent electric current in electrical conductors for telegraphic communication a strand, cord, or rope, consisting of several conducting wires in contact with each other, with or without hempen or other cores, instead of a single conducting wire for each independent electric current, as formerly practised; such strands, cords, or ropes being coated with gutta percha or other insulating material, and protected either singly or in compound cords by iron cables or otherwise, in a manner similar to that now known and practised with respect to single conducting wires for each independent current; and the object of this Invention is to obtain increased sectional area of conducting wires and increased security against interruption of the communication, combined with increased flexibility, or any one or more of these advantages separately or combined.

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